

**UNITED STATES DISTRICT COURT  
SOUTHERN DISTRICT OF NEW YORK**

CARNEGIE INSTITUTION OF  
WASHINGTON and M7D CORPORATION,

Plaintiffs,

v.

PURE GROWN DIAMONDS, INC. and  
IIA TECHNOLOGIES PTE. LTD. d/b/a  
IIA TECHNOLOGIES,

Defendants.

Case No. 20-cv-189 (JSR)

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**MEMORANDUM OF LAW IN SUPPORT OF DEFENDANTS PURE GROWN  
DIAMONDS, INC. AND IIA TECHNOLOGIES PTE. LTD.'S  
MOTION FOR SUMMARY JUDGMENT**

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For the reasons stated below, Defendants Pure Grown Diamonds, Inc. (“PGD”) and IIa Technologies Pte. Ltd. (“2AT”) respectfully request summary judgment of both no infringement and invalidity with respect to all asserted claims of U.S. Patent No. 6,858,078 (“the ’078 Patent”) and U.S. Patent No. RE41,189 (“the ’189 Patent”).

## **I. THE ASSERTED PATENTS**

The ’078 Patent is directed to growing single-crystal diamond by microwave plasma chemical vapor deposition (“MPCVD”). The asserted claims (claims 1, 6, 11, 12, 16, and 20) recite specific conditions associated with the process, including the crystallinity of the grown diamond, growth temperature, temperature gradients, pressures, and growth rates. Local Civil Rule 56.1 Statement of Material Facts (“SOF”) at ¶ 3.

The ’189 Patent is directed to a method for annealing a CVD diamond at high temperatures and pressures, with the asserted claims (claims 1 and 2) reciting specific temperature and pressure conditions. SOF at ¶ 120.

## **II. LEGAL STANDARD ON SUMMARY JUDGMENT**

A moving party must show an absence of a genuine and material fact issues, as well as entitlement to judgment as a matter of law. *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 250 (1986). If a moving party provides a properly supported motion, the adverse party “must set forth specific facts showing that there is a genuine issue for trial.” *Id.* at 256. Sufficient evidence must support a jury verdict in the adverse party’s favor. If “the evidence is merely colorable or is not significantly probative, summary judgment may be granted.” *Id.* at 249-50 (citations omitted).

## **III. THE ’078 PATENT IS NOT INFRINGED AND IS INVALID**

### **A. THE ASSERTED ’078 PATENT CLAIMS ARE NOT INFRINGED**

The ’078 Patent identifies a problem: “Typically, attempts to produce single-crystal diamond at growth rates higher than about one micrometer per hour result in **heavily twinned**

*single crystal diamonds, polycrystalline diamond*, or no diamond at all.” SOF at ¶ 6 (emphasis added). It makes an observation: “Precise control over growth surface temperatures and growth surface temperature gradients *prevents the formation of polycrystalline diamond or twins* such that a large single crystal diamond can be grown.” SOF at ¶ 7 (emphasis added). To exploit this observation, the ’078 Patent proposes a special mount for the diamond: a substrate holder that “holds the diamond 136 in a stationary position and acts as a heat-sink to *prevent the formation of twins or polycrystalline diamond along the edges of the growth surface* of the diamond 136.” SOF at ¶ 10 (emphasis added); *see also id.* at SOF at ¶ 13.

The photo on the left below shows the result of the patented technique. *See* SOF at ¶ 21. It comes from a publication authored by the named inventors, which the ’078 Patent incorporates by reference to describe “the diamond produced in the examples” of the patent. *See* SOF at ¶ 20. Dr. Hemley, one of the named inventors, testified [REDACTED]  
[REDACTED]  
[REDACTED] SOF at ¶ 22.

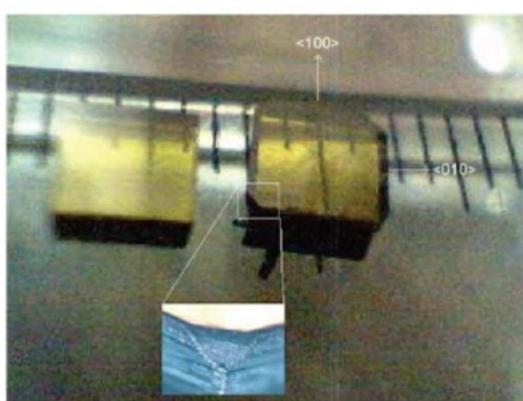
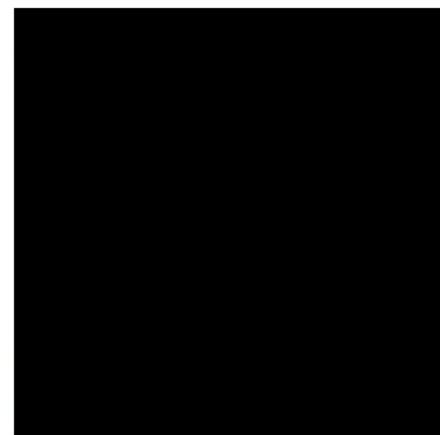


Fig. 1. Photograph of seed and as-grown unpolished CVD diamond and a magnification of CVD-diamond corner. The (100) direction corresponds to the four sides of the diamond cube.

SOF at ¶ 21



SOF at ¶ 72

Unlike the methods taught in the ’078 Patent, [REDACTED]

[REDACTED] Nor does 2AT use the growth conditions taught in the ’078

Patent. See SOF at ¶¶ 44-51, 61-66. Unsurprisingly, 2AT does not achieve the purported benefit of practicing the '078 Patent— [REDACTED]. The photograph on the right above is a representative example of diamonds grown using 2AT's accused process. SOF at ¶ 72. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

### **1. Defendants do not literally infringe the '078 Patent**

To show literal infringement of a method claim, Plaintiffs must prove the accused process meets each and every feature of the claimed method. *MicroStrategy Inc. v. Business Objects, S.A.*, 429 F.3d 1344, 1352 (Fed. Cir. 2005). They have not and cannot do so here.

#### **a. The accused process does not practice the claimed pressures**

2AT's process takes place at [REDACTED] and there is no contrary evidence, including from Plaintiffs' expert. SOF at ¶¶ 48, 63, 64. Claim 1 requires "an atmosphere with a pressure of at least 130 torr." SOF at ¶ 3. Claims 6 and 11 incorporate that requirement by reference. Claim 16 requires "a pressure of . . . 130–400 torr." *Id.* No reasonable juror could find literal infringement because [REDACTED] is not at least 130 torr or between 130–400 torr. Summary judgment of no literal infringement of claims 1, 6, 11, and 16 is thus appropriate.

#### **b. The accused process does not practice the claimed temperatures**

2AT's process takes place [REDACTED] and there is no contrary evidence, including from Plaintiffs' expert. SOF at ¶¶ 49-51, 61, 62. Claim 12 requires "a temperature of 900–1400° C." SOF at ¶ 3. Dependent claims 16 and 20 incorporate that requirement. No reasonable juror could find literal infringement because temperatures [REDACTED] are not between

900–1400° C. Summary judgment of no literal infringement of claims 12, 16, and 20 is proper.

**c. The accused process does not produce stand-alone diamond with insubstantial non-monocrystalline growth**

All asserted claims require “growing single-crystal diamond by microwave plasma chemical vapor deposition on the growth surface . . .” SOF at ¶ 3. During claim construction, the parties “disagree[d] about how to describe the amount of impurity that is acceptable” in the claimed “single-crystal diamond.” ECF No. 46 at 28. This Court resolved that dispute by construing “single-crystal diamond” as “stand alone diamond having insubstantial non-monocrystalline growth.” *Id.* at 27-29. Non-monocrystalline growth would include, for example, polycrystalline growth, twinned single-crystal diamond, graphite, and diamond-like carbon. *See id.* at 28-29; SOF at ¶¶ 5, 6, 7, 15.

The ’078 Patent distinguishes “single-crystal diamond,” which the claims require, from material with “heavily twinned single crystal diamond” and “polycrystalline diamond.” SOF at ¶¶ 3 and 6. Dr. Vohra, one of the inventors, confirmed that “in this field, even if you know there is one twin, then it’s not a single crystal.” SOF at ¶ 69. He also testified that if there are black spots on the surface, “[t]hat’s definitely twinning” and “definitely not single crystal.” SOF at ¶ 70. “Visually, you can tell.” *Id.* Dr. Hemley, the only other inventor to provide testimony, further remarked that [REDACTED]

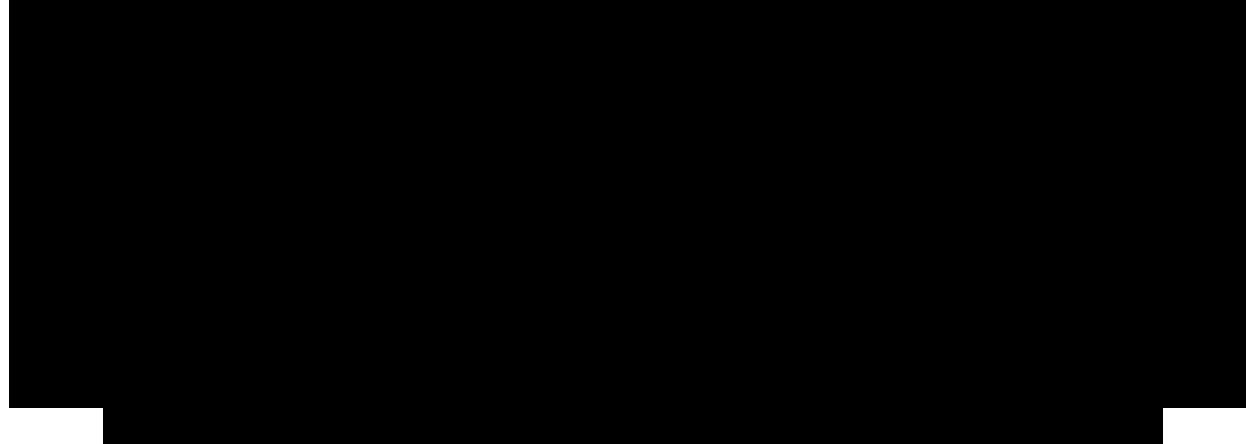
[REDACTED] The ’078 Patent confirms that “isolated ‘outcroppings’ or twins . . . may be verified visually.” SOF at ¶ 15.



The photograph on the left above is an example of what emerges from 2AT's reactors at the completion of a growth run. SOF at ¶ 57. The central portion of that structure is an as-grown rough diamond block. SOF at ¶ 72. The photograph in the middle above shows



SOF at ¶ 59. The photograph on the right above is an enlarged view of



No reasonable juror could view 2AT's

SOF at ¶ 57, 72, 76, 77.

Plaintiffs' expert, Dr. Capano, tries to create a dispute by redefining the Court's claim construction. Specifically, he opines that [REDACTED]

SOF at ¶ 74 (emphasis added)

dispute, not a factual one, and Dr. Capano is mistaken. This Court construed “single-crystal diamond” to resolve the parties’ “disagree[ment] about how to describe *the amount of impurity* that is acceptable.” ECF No. 46 at 28 (emphasis added). Because the [REDACTED]

[REDACTED] not subject to reasonable dispute, summary judgment of no literal infringement of all asserted claims is proper.

d.

All asserted claims require “controlling temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20° C.” SOF at ¶ 3. The **temperature** of the growth surface is not the same as the **temperature gradients** on the growth surface. SOF at ¶ 104. Dr. Vohra testified that temperature and temperature gradient are controlled by different techniques. SOF at ¶ 105. **Temperature** is controlled by adjusting the microwave power or the distance of the diamond relative to the plasma. *Id.* **Temperature gradients**, however, are controlled by using a substrate holder that provides heat-sinking to the side surfaces of the diamond. *Id.*

. The '078 Patent states, "Precise

control over growth surface temperatures and growth surface temperature gradients prevents the formation of polycrystalline diamond or twins . . . .” SOF at ¶ 7. [REDACTED]

[REDACTED]

[REDACTED] According to the '078 Patent, this would not occur if all temperature gradients were maintained less than 20° C. SOF at ¶¶ 6, 7. That is because the '078 Patent recognizes what is sometimes called the “edge effect.” *See* Exhibit 1, '078 Patent at 7:5-23, Fig. 2b; SOF at ¶ 78. This refers to the plasma coupling more strongly to the edges of the growth surface, causing a “temperature rise at the edges and corners” such that “dislocations, twins and other defects are more likely to occur.” SOF at ¶ 78. The solution proposed by the '078 Patent was to provide additional heat sinking at the edges of the diamond [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] As Dr. Vohra explained, this controls temperature, not temperature gradients.<sup>1</sup> SOF at ¶ 53. The '078 Patent is very different. It describes measuring temperature gradients during the growth process and using that information to adjust the process. *See* SOF at ¶ 13.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] But those results are not even necessary for a finding of summary judgment.

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<sup>1</sup> This way of controlling temperature was known before the application for the '078 Patent was filed. SOF at ¶ 54.

As explained above, there can be no genuine dispute regarding [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Plaintiffs cannot create a genuine issue in this regard. Dr. Capano only presents

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] Putting aside the factual problems with those opinions, they are legally irrelevant. Infringement “is determined by comparing *an accused product* . . . with the properly and previously construed claims in suit.” *SRI Int’l v. Matsushita Elec. Corp.*, 775 F.2d 1107, 1121 (Fed. Cir. 1985) (en banc) (emphasis added). Dr. Capano failed to make that comparison.

Dr. Capano’s opinions are also based on a claim construction directly contrary to the one this Court issued, as illustrated below. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] Thus, Dr. Capano’s opinions do not present a factual dispute, only a legal one that this Court already resolved.

Court’s Order	Dr. Capano’s Report
“Plaintiffs’ proposed construction . . . <b>would wrongly restrict the term</b>	[REDACTED]

<p><b>to include only surface area where single-crystal diamond is growing.”</b> ECF No. 46 at 19 (emphasis added).</p>	<p>claims 1 and 12 expressly state ‘growing single-crystal diamond by microwave plasma chemical vapor deposition on the growth surface’.</p> <p>Capano Report at ¶ 180 (emphases added).</p>
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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] Summary

judgment of no literal infringement of all asserted claims is thus warranted.

**2. Defendants do not infringe the '078 Patent under DOE**

**a. Plaintiffs are precluded from arguing infringement under DOE as a matter of law**

The doctrine of equivalents (“DOE”) states that “a product or process that does not literally infringe upon the express terms of a patent claim may nonetheless be found to infringe if there is ‘equivalence’ between the elements of the accused product or process and the claimed elements of the patented invention.” *Warner-Jenkinson Co., Inc. v. Hilton Davis Chemical Co.*, 520 U.S. 17, 21 (1997). But DOE cannot serve as a vehicle for reclaiming subject matter a patentee previously surrendered. As the Federal Circuit has held, “[h]aving specifically identified, criticized, and disclaimed [a particular] configuration, the patentee cannot now invoke the doctrine of equivalents to ‘embrace a structure that was specifically excluded from the claims.’” *SciMed Life Sys. v. Advanced Cardiovascular*, 242 F.3d 1337, 1345 (Fed. Cir. 2001). That is what Plaintiffs seek to do here.

Independent claims 1 and 12 of the '078 Patent require the following:

- growing single-crystal diamond by microwave plasma chemical vapor

deposition on the growth surface at a growth temperature in a deposition chamber having an atmosphere with a pressure of at least 130 torr (claim 1);

- growing single-crystal diamond by microwave plasma chemical vapor deposition on the growth surface at a temperature of 900–1400° C. (claim 12).

SOF at ¶ 3. The '078 Patent affirms the importance of these limitations. It acknowledges that growing diamond by MPCVD at lower temperatures and pressures was known, providing various examples of such processes and criticizing them. SOF at ¶¶ 5, 6. The '078 Patent also notes the importance of preventing non-monocrystalline growth, criticizing prior-art processes that yield diamond material with “heavily twinned single crystal diamonds [or] polycrystalline diamond.” SOF at ¶ 6; *see also* SOF at ¶ 15. Plaintiffs now seek to recapture this subject matter.

Plaintiffs tried and failed to reclaim these features through claim construction. This Court rejected Plaintiffs’ proposed construction of “growth surface” because it “would wrongly restrict the term to include only surface area where single-crystal diamond is growing,” thereby permitting Plaintiffs to ignore non-monocrystalline growth. ECF No. 46 at 19. This Court also found that Plaintiffs’ proposed constructions “wrongly suggest[] that a method that imposes the specified temperatures and pressures even momentarily would infringe the '078 Patent.” *Id.* at 22. “Such a construction would be improper because the '078 Patent **expressly distinguishes** the claimed method from prior art CVD processes that utilize **lower temperatures and pressures** to synthesize diamond at a lower growth rate.” *Id.* (citing SOF at ¶¶ 5, 6) (emphasis added). Plaintiffs now contend that 2AT’s process is equivalent to the claimed method, despite the substantial non-monocrystalline growth that results and the lower temperatures and pressure used. But, “by defining the claim in a way that clearly excluded certain subject matter, the patent implicitly disclaimed the subject matter that was excluded and thereby barred the patentee from asserting infringement under the doctrine of equivalents.” *SciMed Life Sys.*, 242 F.3d at 1346.

*SciMed Life Systems* and the line of cases cited in that opinion preclude application of DOE here as a matter of law. *See id.* at 1347 (finding “the patentee cannot be allowed to recapture the excluded subject matter under the doctrine of equivalents without undermining the notice function of the patent”); *see also Astrazeneca AB v. Mutual Pharm.* 384 F.3d 1333, 1342 (Fed. Cir. 2004) (finding that “[t]he specification’s clear disavowal of nonsurfactant solubilizers precludes the application of the doctrine of equivalents to recapture the disavowed solubilizers”); *Eastman Kodak Co. v. Goodyear Tire & Rubber Co.*, 114 F.3d 1547, 1559-61 (Fed. Cir. 1997) (affirming noninfringement under DOE because the claims required using “inert gas,” the specification described the problems with using certain oxygen concentrations, and the accused process used “heated air,” which contained large amounts of oxygen); *Dolly, Inc. v. Spalding & Evenflo Companies, Inc.*, 16 F.3d 394, 400 (1994) (explaining that “the concept of equivalency cannot embrace a structure that is specifically excluded from the scope of the claims” and finding the district court erred in applying the doctrine of equivalents). Consistent with the rationale in these decisions, Plaintiffs should be barred from asserting infringement under DOE.

**b. There are no genuine issues of material fact regarding DOE**

To the extent DOE is not barred outright, no genuine issues of material fact preclude summary judgment. “Infringement under [DOE] has been judicially devised to do equity in situations where there is no literal infringement, but liability is nevertheless appropriate to prevent what is in essence a pirating of the patentee’s invention.” *Texas Instruments Inc. v. U.S. Int’l Trade Com’n*, 988 F.2d 1165, 1173 (Fed. Cir. 1993) (quotation omitted). This is not a situation in which 2AT is “‘stealing the benefit of the invention’ by making insubstantial changes that avoid the literal scope of the claims.” *EMI Grp. N.A., Inc. v. Intel Corp.*, 157 F.3d 887, 896 (Fed. Cir. 1998) (citation omitted).

2AT’s accused process is the product of years of independent and significant R&D. ■■■

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] This

level of experimentation shows 2AT’s process is substantially different from the one in the ’078 Patent. *See Warner-Jenkinson*, 520 U.S. at 36 (“Independent experimentation by the alleged infringer . . . would likely be probative . . .”).

“What constitutes equivalency must be determined against the context of the patent, the prior art, and the particular circumstances of the case.” *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 610 (1950). Courts often ask “whether the accused device ‘performs [1] substantially the same function [2] in substantially the same way to obtain [3] the same result’ as the claim limitation.” *Catalina Mktg. Int’l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 813 (Fed Cir. 2002). But this test “provides a poor framework” for analyzing non-mechanical processes. *Warner-Jenkinson*, 520 U.S. at 39–40. “That seems to be particularly true in the chemical arts.” *Mylan Institutional LLC v. Aurobindo Pharma Ltd.*, 857 F.3d 858, 867 (Fed. Cir. 2017). In such cases, a court may ask whether a skilled artisan would have found the differences between the accused process and claimed invention “insubstantial.” *See id.* at 866–69.

Here, MPCVD diamond growth is a complex technology, not just chemically, but mechanically and electrically. Dr. Vohra, for example, testified that “it’s really a complicated, complicated thing to consider what effect different parameters have.” SOF at ¶ 107. He agreed that “if you change one thing in the system, it might affect other things.” *Id.* One of his graduate students remarked, “Any small variation in growth conditions can lead to huge changes in the

behavior of growth radicals in the plasma and near the substrate surface and it is nearly impossible to account for all possible changes in a theoretical explanation.” *Id.* More than a decade after the ’078 Patent, Dr. Hemley similarly acknowledged that “[t]he details [of CVD diamond growth] are still not completely understood.” SOF at ¶ 110.

Plaintiffs’ only evidence of equivalents comes from Dr. Capano’s opinions, which largely ignore the complexities of this technology and the critical process differences. Exhibit 10, Capano Inf. Rep. at ¶¶ 224-25, 241-64, 277-93, 302, 304, 334. In all asserted claims, the process takes place on “the growth surface,” and “all temperature gradients across the growth surface are less than 20° C.” SOF at ¶ 3. The only way the ’078 Patent achieves such a growth environment is by using specific sample holders, growth chemistries, temperatures, and pressures.

[REDACTED]

[REDACTED] Dr. Capano does not address those differences. He instead opines only that [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] This is a list of generic components any MPCVD system would have. It ignores the substantial differences in design and operation of those components between 2AT’s process and the patented process. *See AquaTex Indus., Inc. v. Technique Solutions*, 479 F.3d 1320, 1326 (Fed. Cir. 2007) (noting the DOE “inquiry focuses on an examination of the claim and the explanation of it found in the written description of the patent” (quotation omitted)).

2AT’s process is different [REDACTED]

[REDACTED]

[REDACTED]

██████████ contrary to the alleged results of the patented method. SOF at ¶¶ 57, 72, 76, 77.

Specific to claim 1, Dr. Capano's opinion that 2AT's pressure is equivalent to the claimed pressure range is also improper. He opines that 2AT could change the pressure in its own process to 130 torr instead ██████████ SOF at ¶ 92. Defendants strongly dispute that suggestion, but it is legally irrelevant. Infringement "is determined by **comparing an accused product** not with a preferred embodiment . . . or with a commercialized embodiment . . . , but **with the properly and previously construed claims in suit.**" *SRI*, 775 F.2d at 1121 (emphases added). Dr. Capano's comparison of 2AT's process to a hypothetical version of 2AT's process is improper. A pressure ██████████ in 2AT's process is substantially different than the claimed pressure of 130 torr not just because of the pressure, but because of the many other process differences relevant to the claim limitation at issue and the patent's context. Dr. Capano's testimony fails to raise a genuine issue of material fact on claim 1.

Dr. Capano also fails to raise a genuine issue of material fact regarding infringement of claim 12 under DOE for largely the same reasons. The only difference is that, instead of raising the pressure, Dr. Capano opines 2AT could ██████████

██████████ Again, comparing 2AT's process to a hypothetical version of 2AT's process is the wrong analysis. *See SRI*, 775 F.2d at 1121. Dr. Capano also ignores that temperatures below 1000° C. in the process disclosed by the '078 Patent are only possible when using oxygen. *See Section III.B* ██████████ This is another substantial difference between 2AT's process and the claimed process.

This is not a situation where 2AT skirts the '078 Patent by substituting one component of the claimed process for a simple substitute. ██████████

██████████ Beyond the many differences in process conditions, the ultimate

difference between 2AT's process and the claimed process is readily apparent in the resulting material itself, shown in the introduction to Section III above. As explained in Sections III.A.1.c and III.A.1.d, [REDACTED]

[REDACTED] This should come as no surprise since 2AT does not literally practice the claimed methods. That 2AT does not achieve the key benefit allegedly provided by the patented method indicates a substantial difference. Accordingly, summary judgment of no infringement under DOE is appropriate.

### **3. Defendant's extraterritorial conduct does not infringe the '078 Patent**

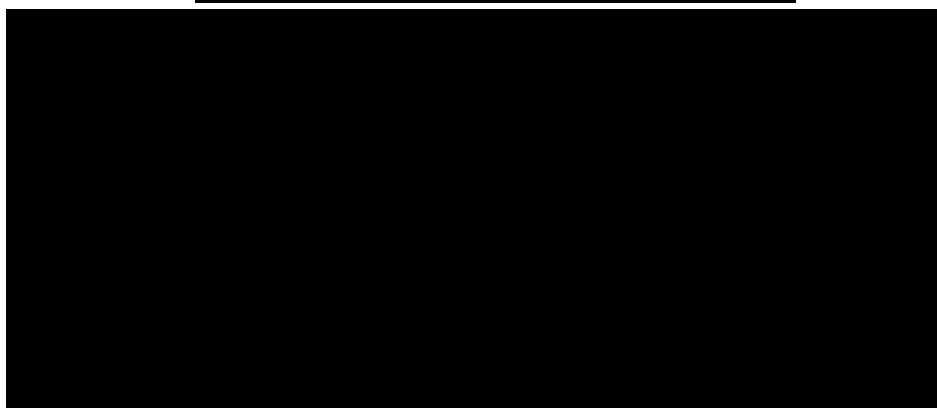
Plaintiffs improperly seek extraterritorial enforcement of a U.S. patent. The asserted claims of the '078 Patent are directed to a method for growing CVD diamonds. Of the two defendants, only 2AT grows diamonds, and it does so outside the U.S., in Singapore. SOF at ¶ 25.

Plaintiffs contend that 2AT's extraterritorial conduct directly infringes the '078 Patent under 35 U.S.C. §§ 271(a) and (g), and indirectly under 35 U.S.C. §§ 271(b) and (c). Yet, § 271(a) does not proscribe 2AT's foreign activities because "a process cannot be used 'within' the United States as required by section 271(a) unless each of the steps is performed within this country." *NTP, Inc. v. Research In Motion, Ltd.*, 418 F.3d 1282, 1318 (Fed. Cir. 2005), *cert. denied*, 546 U.S. 1157 (2006). On § 271(g), Congress narrowed its extraterritorial scope by providing that a product is not "made" by the patented process unless "it is **materially changed** by subsequent processes." *Id.* § 271(g)(1) (emphasis added). Plaintiffs must show 2AT's grown diamonds are not "materially changed by subsequent processes" before they are imported. *See Genentech, Inc. v. Boehringer Mannheim GmbH*, 47 F. Supp. 2d 91, 107-08 (D. Mass. 1999); *Eli Lilly & Co. v. Am. Cyanamid Co.*, 896 F. Supp. 851, 855-56 (S.D. Ind. 1995), *aff'd* 82 F.3d 1568 (Fed. Cir. 1996).

Plaintiffs themselves contend that 2AT infringes the '189 Patent by performing a **subsequent process** that reduces impurities and structural defects to improve optical clarity. SOF at ¶ 121. That necessarily leads to a **materially change**. “In the chemical context, a ‘material’ change in a compound is most naturally viewed as a significant change in the compound’s structure and properties.” *Eli Lilly & Co. v. Am. Cyanamid Co.*, 82 F.3d 1568, 1573 (Fed. Cir. 1996). Subsequent annealing alters a diamond’s atomic structure and chemical and physical properties. The '189 Patent specifically explains that “treating CVD diamond at high pressure and high temperature (HPHT) causes the optical properties to change so much that opaque material become clear.” SOF at ¶ 123. It postulates that “internal atoms shift position” or their “bonding mechanism shifts” so that the carbon atoms “change from impurity status to becoming part of the diamond crystal lattice.” SOF at ¶ 124. Consistent with the '189 Patent’s disclosure, Dr. Frushour, one of the original inventors, testified that [REDACTED]

[REDACTED] Similarly, the scientific literature confirms that annealing significantly changes a CVD grown diamonds’ atomic structure and physical properties. SOF at ¶ 128.

[REDACTED] This can be seen from the example “before” and “after” photos [REDACTED]:



SOF at ¶ 150. These changes also relate to an important feature of CVD diamonds and a change to their basic utility. *See Eli Lilly*, 82 F.3d at 1577. Color and clarity are two of the “4 Cs” that drive consumer purchases. SOF at ¶ 149. Subsequent annealing of CVD grown diamonds speaks to both. The ’189 Patent discloses “it would be advantageous” to “significantly improve the properties of CVD diamond after it is grown,” and “desirable to form CVD diamond with fewer defects” to “enhance its usage in many applications.” SOF at ¶ 122. Because annealing significantly changes the properties of CVD diamonds, they are “materially changed by subsequent processes.”

Plaintiffs’ inability to show 2AT’s extraterritorial conduct directly infringes the ’078 Patent under either § 271(a) or § 271(g) dooms their indirect infringement claims. Absent liability for direct infringement, there can be no liability for indirect infringement under § 271(b) or § 271(c). *See Limelight Networks, Inc. v. Akamai Techs., Inc.*, 572 U.S. 915, 917 (2014) (§ 271(b)); *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 377 U.S. 476, 482-83 (1964) (§ 271(c)). Thus, summary judgment that the ’078 Patent is not infringed is appropriate.

#### **B. THE ASSERTED ’078 PATENT CLAIMS ARE INVALID**

Fundamental to the patent right is the requirement to describe and enable the full scope of the invention as claimed. If, at the effective filing date, a skilled artisan could not practice the full scope without undue experimentation, the claim is not enabled. *Idenix Pharm. LLC v. Gilead Scis.*, 941 F.3d 1149 (Fed. Cir. 2020). If the specification does not “reasonably convey[] . . . that the inventor had possession of the claimed subject matter[,]” the claim lacks written description. *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc).

##### **1. All the asserted ’078 Patent claims are invalid under 35 U.S.C. § 112 for lack of enablement and written description**

All asserted claims of the '078 Patent require "controlling the temperature of the growth surface such that all temperature gradients across the growth surface are less than 20° C." SOF at ¶ 3. The only disclosure for achieving that result is specific to using a substrate holder that makes thermal contact with the side surfaces of the diamond. The claims, however, do not recite such structure, only a broad and purely functional result regarding temperature gradients. Plaintiffs now advance those claims with significantly more breadth than described in the patent. This gap between the patent's disclosure and Plaintiffs' allegations highlights the invalidity of the claims.

This is not a situation where the patent's description needs to be considered solely through the hindsight opinions of experts. The gap in the patent's disclosure and claims has been confirmed by party admissions. Years before this suit, Plaintiffs described the '078 Patent as

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

The '078 Patent provides a specific solution to achieve the claimed method of controlling the 20° C. temperature gradient across the growth surface—using a substrate holder that makes thermal contact with the side surfaces of the diamond. That is what the figures illustrate and the specification describes. SOF at ¶¶ 8- 13. Every embodiment includes a substrate holder that makes thermal contact with the side surfaces of the diamond (SOF at ¶¶ 8, 9) and each describes

how to position the diamond to achieve the required heat-sinking effect to maintain the claimed temperature gradients. SOF at ¶¶ 10-13. That is the purported invention—what the inventors possessed and what the patent enables.

Consistent with the inventor testimony, a skilled artisan would understand from the '078 Patent that the described substrate holder design is critical to the invention. For example, Dr. Vohra explained one of the key innovations of the '078 Patent was control of thermal gradients “by a proper heat sink design of the substrate hold[er].” SOF at ¶ 102. Uniformity of temperature on the growth surface, as Dr. Vohra testified, “really depends on the substrate holder design, which is critical in controlling the uniformity of temperature.” SOF at ¶ 103; *see Exhibit, 30 Liang-1* at 197. As Plaintiffs now assert them, the claims would cover *all* methods of controlling the temperature gradients on the growth surface below 20° C., no matter how it might be achieved.

While the patent recognizes that numerous factors influence “[t]he **ability to control** all of the temperature gradients across the growth surface of the diamond,” (SOF at ¶ 14 (emphasis added)), it provides no description or guidance on how these factors would be used to exploit anything other than the specific substrate holders described. As the named inventors acknowledge, this is not trivial. SOF at ¶¶ 102, 103. More than a decade after the '078 Patent filing date, three of the four inventors acknowledged, “One of the critical issues in diamond synthesis employing an MPCVD reactor is the behavior of plasma-substrate and plasma-substrate holder interactions.” SOF at ¶ 106. This highlights the complexity and unpredictability of the art, and it shows the need for undue experimentation to use something other than the substrate holder design described in the '078 Patent. *Alza Corp. v. Andrx Pharms., LLC*, 603 F.3d 935, 941 (Fed. Cir. 2010).

A skilled artisan, when reviewing the '078 Patent's limited disclosure and considering the complexities of controlling temperature gradient, would recognize the gap between the patent's disclosure and claims; a gap that cannot be filled by their knowledge. *Id.* at 941 ("To satisfy the plain language of § 112, ¶ 1, [the patentee] was required to provide an adequate enabling disclosure in the specification; it cannot simply rely on the knowledge of a person of ordinary skill to serve as a substitute for the missing information in the specification.").

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

**2. Claims 12, 16, and 20 of '078 patent are invalid under 35 U.S.C. § 112 for lack of written description**

Claims 12, 16, and 20 cover a temperature range of 900–1400° C, with or without oxygen, but the '078 Patent only describes growth at a temperature below 1000° C when oxygen is used. Specifically, the '078 Patent explains that "[t]he process temperature may be selected from a range of about 900-1400° C., depending on the particular type of single-crystal diamond that is desired or if oxygen is used." SOF at ¶ 16. The two examples from the specification confirm the interplay of temperature and oxygen the inventors found necessary in the claimed process. Specifically, Table 1 shows that at temperatures below 1000° C without oxygen, the process resulted in diamond-like carbon, not single-crystal diamond. The specification explains that a "CVD single crystal diamond over 0.6 mm in thickness was created substantially in

accordance with the procedure of Example 1 above by *adding a small amount (1-3%) of oxygen* and *lowering the growth temperature to 900 degrees* Celsius. *The added oxygen allows a lower growth temperature . . .*” SOF at ¶ 19 (emphases added).

Based on these disclosures, a skilled artisan would understand the inventors, at best, described (1) growing a single-crystal diamond with no oxygen at temperatures higher than 1000° C, and (2) growing a single-crystal diamond at temperatures of 900–1000° C only when “a small amount (1-3%) of oxygen” is used. *Id.* They did not possess an invention that allowed for growing a single-crystal diamond with no oxygen at temperatures below 1000° C. [REDACTED]

[REDACTED]

[REDACTED]

The ’078 Patent also incorporates by reference a paper by the inventors that explains “the growth morphology and color strongly depend on temperature,” confirming that “spherical black diamond-like carbon was produced below 1,000° C . . .” SOF at ¶ 23. Inventor Vohra confirmed the same, noting that “below a 1000 degrees C without oxygen, [he] grew spherical black diamond-like carbon” and it was the addition of oxygen that allowed him to reduce the growth temperature to grow diamond. SOF at ¶ 116.

The structure and requirements of other claims similarly confirm what the patent describes. Claim 4 recites a temperature range of 900–1400° C., which requires 1–3% oxygen, whereas claim 7 recites a range of 1000–1400° C., with no oxygen requirement. *See also* Exhibit 1, ’078 patent at claims 4 and 7. This distinction highlights the importance of oxygen to the claimed temperature range. *See also id.* at claims 23, 24, 27. Since claim 12 covers what the patent fails to adequately describe (i.e., growing a single-crystal diamond with no oxygen at a temperature range of 900–1400° C.), summary judgment of invalidity under 35 U.S.C. § 112, ¶ 1,

is appropriate for claim 12 and dependent claims 16 and 20.

#### IV. THE '189 PATENT IS INVALID OR ALTERNATIVELY, NOT INFRINGED

##### A. THE ASSERTED '189 PATENT CLAIMS ARE INVALID AS INDEFINITE

Section 112 of the Patent Statute requires that “claims particularly point[] out and distinctly claim[] the subject matter which the applicant regards as his invention.” 35 U.S.C. § 112, ¶ 2. Where the claims require a specific measurement (here, “diamond-graphite boundary”) and multiple measurement methods may be used, yielding different results, the claims, specification, and file history must provide guidance on which method to use or the claims are indefinite. *See Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 789 F.3d 1335, 1345 (Fed. Cir. 2015).

In *Teva*, there were three measures of the claimed “molecular weight,” each yielding a different value. *Id.* at 1338. Neither the claims nor the specification defined “molecular weight,” the term did not have a plain meaning to those skilled in the art, and the prosecution history contained inconsistent statements about which metric to use. *Id.* at 1341-44. Despite expert testimony that a skilled artisan could determine which measure was most appropriate (*id.* at 1338, 1341), the Federal Circuit found the patent failed to provide reasonable certainty about the scope of the claim and invalidated it. *Id.* at 1344-45; *see also Dow Chem. Co. v. Nova Chems. Corp.*, 803 F.3d 620, 631-635 (Fed. Cir. 2015); *Honeywell Int'l, Inc. v. Int'l Trade Comm'n*, 341 F.3d 1332, 1339-40 (Fed. Cir. 2003). The same analysis applies here.

Claim 1 requires annealing “outside of the diamond stable phase.” SOF at ¶ 120. Adopting the parties’ agreed construction, the Court interpreted this limitation as requiring “a temperature and pressure combination that falls below the diamond-graphite boundary.” EFC 46 at 25-27. As of June 3, 2002 (the filing date), and even today, multiple definitions for the diamond-graphite boundary existed, each yielding different results. *See, e.g.*, SOF at ¶¶ 133-139,

143; Exhibit 51 (noting “sharply different” results reported in the literature). [REDACTED]

[REDACTED]

[REDACTED] And each yield different results. SOF at ¶ 133-139, 143; Exhibit 51.

As in *Teva*, the intrinsic record fails to resolve the uncertainty caused by these competing definitions. The claims recite no definition. The specification mentions only operating “where graphite is the stable phase” and “within the graphite stable region” (SOF at ¶ 131), which is no more helpful than the claims. And the file history provides no guidance on which definition of the diamond-graphite boundary to use. SOF at ¶ 132.

This lack of guidance “leav[es] the skilled artisan to consult the unpredictable vagaries of any one person’s opinion.” *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1374 (Fed. Cir. 2014). Dr. Capano opines [REDACTED]

[REDACTED]

[REDACTED] SOF at ¶ 141. But indefiniteness “trains on the understanding of a skilled artisan **at the time of the patent application**, not that of a court viewing matters *post hoc*.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898 at 911 (2014) (emphasis added). The *Day* reference did not exist as of June 3, 2002, when the patent application was filed. In fact, it was not published until a decade later. SOF at ¶ 140. And, as in *Teva*, even if the patentees’ expert believes a skilled artisan could determine an appropriate definition, the claims are indefinite because the intrinsic record fails to resolve the ambiguity. *See Dow*, 803 F.3d at 635 (citing *Teva*, 789 F.3d at 1338, 1341).

As a matter of law, the “outside of the diamond stable phase” limitation of claim 1 is indefinite. Dependent claim 2 also fails to resolve the ambiguity, rendering both claims invalid.

**B. THE ASSERTED '189 PATENT CLAIMS ARE NOT INFRINGED**

To the extent a skilled artisan could determine an appropriate definition of the diamond-graphite boundary to use at the time of the patent application, they would have identified the definition in *Bundy* ( [REDACTED]

*Bundy* was co-authored by Drs. Hemley and Mao, two of the named inventors. See SOF at ¶ 136. At the time of the patent application, *Bundy* was the most up-to-date and reliable authority on the diamond-graphite boundary. See Exhibit 57, De Weerdt Rebuttal Rp. on '189 Patent at ¶ 269. For example, Dr. Hemley

[REDACTED] SOF at ¶ 134, 135. In fact, nearly twenty years later [REDACTED]

See SOF at ¶ 152.

Dr. Capano's opinions cannot create a genuine issue of material fact. As explained above, he erred as a matter of law [REDACTED], which did not exist at the time of the patent application. Also, he incorrectly argues that in a

This is false

Under the *Bundy* definition, there is no dispute that 2AT's annealing processes does not infringe. Thus, if not indefinite, the Court should grant summary judgment that the asserted claims of the '189 Patent are not infringed.

## V. CONCLUSION

For the reasons stated above, Defendants respectfully submit this Court should grant summary judgment of no infringement and invalidity with respect to all asserted claims the '078 Patent and the '189 Patent.

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Respectfully submitted,

s/ William P. Deni, Jr. \_\_\_\_\_

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